Appendix A

Glossary

A

Glossary

Accident: An unwanted transfer of energy or an environmental condition which, due to the absence or failure of barriers or controls, produces injury to persons, damage to property, or reduction in process output.

Accident Investigation: The systematic appraisal of unwanted events for the purpose of determining causal factors, subsequent corrective actions, and preventive measures.

Accident or Emergency Response Team: A team or teams of emergency and accident response personnel for a particular site. This team may be composed of a number of teams from the site, such as local police and firefighter units, emergency medical personnel, and hazardous material teams.

Analysis: The use of methods and techniques for arranging data to: (a) assist in determining what additional data are required; (b) establish consistency, validity, and logic; (c) establish necessary and sufficient events for causes; and (d) guide and support inferences and judgments.[1]

Analytical Tree: Graphical representation of an accident in a deductive approach (general to specific). The structure resembles a tree—that is, narrow at the top with a single event (accident) and then branching out as the tree is developed, and identifying root causes at the bottom branches.

[1]Ferry, Ted S., *Modern Accident Investigation and Analysis*, 2nd Edition, John Wiley & Sons, New York, New York, 1988.

Appointing Official: A designated authority responsible for assigning accident investigation boards for Type A and Type B investigations, with responsibilities as prescribed in DOE Order 225.1A, Paragraph 5.d.

Barrier: Anything used to control, prevent, or impede energy flows. Common types of barriers include equipment, administrative procedures and processes, supervision/ management, warning devices, knowledge and skills, and physical objects.

Barrier Analysis: An analytical technique used to identify energy sources and the failed or deficient barriers and controls that contributed to an accident.

Board Chairperson: The leader who manages the accident investigation process, represents DOE in all matters regarding the accident investigation, and reports to the appointing official for purposes of the accident investigation.

Board Members: A group of three to six DOE staff assigned to investigate an accident. This group reports to the board chairperson during the accident investigation.

Causal Factor: An event or condition in the accident sequence necessary and sufficient to produce or contribute to the unwanted result. Causal factors fall into three categories:

- Direct cause

- Contributing cause
- Root cause

Cause: Anything that contributes to an accident or incident. In an investigation, the use of the word "cause" as a singular term should be avoided. It is preferable to use it in the plural sense, such as "causal factors," rather than identifying "*the cause.*"

Chain of Custody: The process of documenting, controlling, securing, and accounting for physical possession of evidence, from initial collection through final disposition.

Change: Stress on a system that was previously in a state of equilibrium, or anything that disturbs the planned or normal functioning of a system.

Change Analysis: An analytical technique used for accident investigations, wherein accident-free reference bases are established, and changes relevant to accident causes and situations are systematically identified. In change analysis, all changes are considered, including those initially considered trivial or obscure.

Conclusions: Significant deductions derived from analytical results. Conclusions are derived from and must be supported by the facts, plus results from testing and analyses conducted. Conclusions are statements that answer two questions the accident investigation addresses: what happened and why did it happen? Conclusions include concise recapitulations of the causal factors (direct, contributing, and root causes) of the accident determined by analysis of facts.

Contributing Cause: An event or condition that collectively with other causes increases the likelihood of an accident but that individually did not cause the accident.

Controls: Those barriers used to control wanted energy flows, such as the insulation on an electrical cord, a stop sign, a procedure, or a safe work permit.

Direct Cause: The immediate events or conditions that caused the accident.

DOE Accident Investigator: An individual who understands DOE accident investigation techniques and has experience in conducting investigations through participation in at least one Type A or Type B investigation. Effective October 1, 1998, DOE accident investigators must have attended an accident investigation course of instruction that is based on current materials developed by the Office of Deputy Assistant Secretary for Oversight.

DOE Operations: Activities funded by DOE for which DOE has authority to enforce environmental protection, safety, and health protection requirements.

DOE Site: A tract either owned by DOE, leased, or otherwise made available to the Federal government under terms that afford DOE rights of access and control substantially equal to those it would possess if it held the fee (or pertinent interest therein) as agent of and on behalf of the government. One or more DOE operations/program activities carried out within the boundaries of the described tract.

Energy: The capacity to do work and overcome resistance. Energy exists in many forms, including acoustic, potential, electrical, kinetic, thermal, biological, chemical, and radiation (both ionizing and non-ionizing).

Energy Flow: The transfer of energy from its source to some other point. There are two types of energy flows: wanted (controlled—able to do work) and unwanted (uncontrolled—able to do harm).

Event: An occurrence; something significant and real-time that happens. An accident involves a sequence of events occurring in the course of work activity and culminating in unintentional injury or damage.

Events and Causal Factors Chart: Graphical depiction of a logical series of events and related conditions that precede the accident.

Eyewitness: A person who directly observed the accident or the conditions immediately preceding or following the accident.

Fatal Injury: Any injury that results in death within 30 calender days of the accident.

Field Element: A general term for all DOE sites (excluding individual duty stations) located outside the Washington, D.C. metropolitan area.

General Witness: A person with knowledge about the activities prior to or immediately after the accident (the previous shift supervisor or work controller, for example).

Hazard: The potential for energy flow(s) to result in an accident or otherwise adverse consequence.

Heads of Field Elements: First-tier field managers of the operations offices, the field offices, and the power marketing administrations (Administrators).

Human Factors: The study of human interactions with products, equipment, facilities, procedures, and environments used in work and everyday living. The emphasis is on human beings and how the design of equipment influences people.

Investigation: A detailed, systematic search to uncover the "who, what, when, where, why, and how" of an occurrence and to determine what corrective actions are needed to prevent a recurrence.

Investigation Report: A clear and concise written account of the investigation results.

Judgments of Need: Managerial controls and safety measures necessary to prevent or minimize the probability or severity of a recurrence of an accident.

Lessons Learned: A "good work practice" or innovative approach that is captured and shared to promote its repeated application. A lesson learned may also be an adverse work practice or experience that is captured and shared to avoid recurrence.

Limited Scope Investigation: An accident investigation chartered by the Assistant Secretary for Environment, Safety and Health that is reduced in scope, duration, and resources from that normally associated with a Type A or Type B investigation.

Occurrence: An event or condition that adversely affects or may adversely affect DOE or contractor personnel, the public, property, the environment, or DOE mission.

Occurrence Reporting and Processing System (ORPS): The reporting system established and maintained for reporting occurrences related to the operation of DOE facilities.

Point of Contact: A DOE staff member who is assigned the role of liaison with the Accident Investigation Program Manager in the Office of Security Evaluations (EH-21), who administers the accident investigation program. In this role, the point of contact ensures that site readiness teams are trained in collecting and maintaining initial accident investigation evidence and that their activities are coordinated with accident and emergency response teams.

Principal Witness: A person who was actually involved in the accident.

Readiness Team: Trained personnel who are available to perform initial investigative response activities immediately following an accident. They are responsible for initiating the accident investigation, maintaining the integrity of evidence before the accident investigation board arrives, and supporting the board after its arrival.

Requirements Verification Analysis: A validation technique that determines whether the logical flow of data from analysis to conclusions and judgments of need is based on facts. This technique is conducted after all the analyses are completed.

Root Cause: The causal factor(s) that, if corrected, would prevent recurrence of the accident.

Root Cause Analysis: Any methodology that identifies the causal factors that, if corrected, would prevent recurrence of the accident.

Target: A person, object, or animal upon which an unwanted energy flow may act to cause damage, injury, or death.

Appendix B

References

B

References

a. DOE Order 225.1A, *Accident Investigations.*

b. *Implementation Guide for Use with DOE Order 225.1A (DOE G225.1-1).*

c. DOE Order 232.1, *Occurrence Reporting and Processing of Operations Information,* September 25, 1995.

d. DOE Order 360.1, *Training,* May 31, 1995.

e. DOE Policy 450.4, *Safety Management System Policy,* October 15, 1996.

f. *General Technical Qualification Standard,* Section 5.1, August 26, 1994.

g. *Department-Wide Area Qualification Standard-Occupational Safety Qualification Standard Competencies,* Section 1.4, May 1995.

h. Ferry, Ted S., *Modern Accident Investigation and Analysis,* 2nd Edition, John Wiley & Sons, New York, New York, 1988.

i. Stephenson, Joe, *System Safety 2000: A Practical Guide for Planning, Managing, and Conducting System Safety Programs,* Van Nostrand Reinhold, New York, New York, 1991.

Appendix C

Specific Administrative Needs

C

Specific Administrative Needs

Roles and Responsibilities of The Administrative Coordinator

The onsite administrative coordinator assists the board chairperson and board members in the day-to-day activities of the accident investigation. This includes serving as a central point of contact for the board, making arrangements for office facilities and equipment, managing report production, and maintaining investigation records.

Generally, the administrative coordinator (working closely with the board chairperson) is responsible for:

- Arranging for appropriate onsite office/ work space and furnishings (including a large conference room that can be locked when not in use by the board, several small, hard-walled offices for conducting interviews, a central area to locate a library of documents collected, and several lockable file cabinets)
- Arranging for local court reporter(s)
- Arranging for security badges/passes for board members and property permits for personal equipment (cameras, computers, etc.)
- Arranging for specific security, access, safety, and health training, as required
- Arranging for telephone service and dedicated fax machine
- Arranging for a dedicated, high-speed copy machine that has collating and stapling capability
- Selecting a hotel and reserving a block of rooms
- Obtaining office supplies and consumables for use by board members and support staff
- Arranging for after-hours access to the site and work space
- Serving as the custodian for all keys provided by the site
- Determining site/field office contact for administrative and logistical support
- Preparing and maintaining interview schedules (if requested by board chairperson)
- Creating and maintaining onsite accident investigation files
- Maintaining chain of custody for evidence (if requested by board chairperson)
- Attending daily board meetings and taking notes to assist the chairperson
- Tracking action items and followup activities to completion
- Coordinating report preparation and production activities on site and at Headquarters
- Arranging for shipment of files and records to Headquarters for archiving at the end of the investigation.

Appendix D

Safety Management System

D

Safety Management System Policy Evaluation Factors Using the Five Core Safety Management Functions

Function #1 - Define the scope of work.
Missions are translated into work, expectations are set, tasks are identified and prioritized, and resources are allocated.
Factors to be considered: ■ Work to be performed is adequately defined. ■ Expectations regarding removal or control of identified hazards are known. ■ Required safety support activities are in place. ■ Activities are prioritized based on magnitudes of hazards.
Function #2 - Identify and analyze the hazards.
Hazards associated with the work are identified, analyzed, and categorized.
Factors to be considered: ■ Type and complexity of work is clearly understood. ■ Type and magnitude of hazards are identified. ■ Accident potential is analyzed. ■ Consequences of potential accidents are defined and categorized. ■ Worker familiarity with the hazards; since workers are most familiar with the hazards, they should be encouraged to provide input to the process and receive feedback from the hazards analysis.
Function #3 - Develop and implement hazard controls.
Applicable standards and requirements are identified and agreed upon. Controls to prevent/mitigate hazards are identified. The safety envelope is established and controls are implemented.
Factors to be considered: ■ Type of hazard(s) involved in the work activity is (are) identified. ■ A safety envelope is established. ■ Engineered design features are used to control hazards. ■ Administrative controls are in place. ■ Worker capabilities are commensurate with the work, and training is appropriate and current. ■ Review, approval, and configuration process is appropriate and used.

Function #4 - Perform work within controls.

Readiness to perform work is confirmed and work is performed safely.

Factors to be considered:

- Readiness is confirmed prior to work execution.
- Work is conducted in accordance with controls, procedures, and requirements.
- Safety controls include:
  - Approved safety envelope
  - Established responsibilities and coordination.
  - Conduct of operations program
  - Worker training.
- Workers are empowered to stop work under unsafe conditions.

Function #5 - Provide feedback and continuous improvement.

Feedback information on the adequacy of controls is gathered, opportunities for improving the definition and planning of work are identified and implemented, line and independent oversight is conducted, and, if necessary, regulatory enforcement actions occur.

Factors to be considered:

- There is a system to collect and identify feedback from workers on workplace hazards.
- Management is aware of feedback from workers and first line supervisors. Management has acted on this feedback.
- There is a system for identifying and disseminating lessons learned that are applicable to the site's work processes.
- Work processes and organizational performance have been continuously measured and evaluated to identify improvement opportunities.

Appendix E

Subject Index

E

Subject Index